

## AMENDMENT

## WHAT IS CLAIMED IS:

## Claim 1

A micromixing method for plural types of substance contained in a liquefied matter, which comprises permeating the liquefied matter through a phase separation porous glass body in a the hollow cylindrical shape having numerous microholes in the diameter of 0.03 to 100 micron meters with the differential pressure to promote the mixing in the molecule level.

[[Claim 2]: Canceled

[[Claim 3]: Canceled

## Claim 4

The micromixing method for plural types of substances contained in a liquefied matter according to claim 1, wherein the above mentioned phase separation porous glass body is mainly made of  $\text{SiO}_2$ , and is formed by separating molded borosilicate glass into a phase rich in  $\text{SiO}_2$  and another phase rich in  $\text{B}_2\text{O}_3$  and  $\text{CaO}$ , and is treated in an acid to have the phase rich in  $\text{B}_2\text{O}_3$  and  $\text{CaO}$  to elute, whereby the resulting microholes have cylindrical hole structure.

## Claim 5

The micromixing method for plural types of substances contained in a liquefied matter according to Claim 1, wherein to cause chemical reaction among the plural types of substances.

## Claim 6

The micromixing method for plural types of substances contained in a liquefied matter according to Claim 1, wherein the micromixing method is for producing oligomers or polymers with the micromixing of the liquefied matter containing one or more types of monomers.

[Claim 7]: Withdrawn

Application Number: 10/098,638

Art Unit: 1624

# COMMUNICATION

I, applicant, apologize to you for my late reply.

## 1) Claims

The third amendment on 5/10/2004 is correct, namely, claims 2 and 3 are cancelled and claim 7 is withdrawn with amendment to claim 1, 4, 5 and 6. A new print by a typewriter in permanent dark ink is enclosed in this envelope.

## 2) The services of a registered patent attorney or agent

I greatly appreciate your advise regarding the services of a registered patent attorney or agent. I would like to use the services in near future although I cannot afford to do so this time.

## 3) Schaefer et al. US 2,953,563

F.C.Schaefer and G.A.Peters published the invention of US 2,953,563 and the invention on Journal of Organic Chemistry, 26, 2778-2784 (1961), respectively.

But it is well known that the reaction speed of trimerization of ethyl benzimidate is very slow in the above invention. Therefore the reaction method by Schaefer et al. is not so convenient for actual industry such as bio-chemistry, medicine and agricultural Chemistry.

As shown in the application example (page 7) of the specification of my invention, the reaction speed was increased 7 times at room temperature in comparison with the reaction method by Schaefer and Peters by permeating the prepared solution for the reaction through the phase separation porous glass body.

Example 8 of US 2,953,563 also shows that the reaction speed is very slow (80°C 18Hr, 36% yield) in the reaction method by Schaefer and Peters using the same catalyst, acetic acid, even at 80°C.

Generally speaking, my invention is very different from the invention by Schaefer and Peters. Schaefer and Peters invented catalysts for preparing trisubstituted s-triazines. I invented the micromixing process using phase separation porous glass body to cause and promote chemical reactions, for example preparing trisubstituted s-triazines.

## 4) Schubert et al. US 6,299,657

It is generally known that mixing is important for chemical reaction to proceed.

Schubert et al. invented to mix, for example, A and B by two steps, namely, 1st step to make separate fluid lamellae of A and B using a system of slit-like microchannels and 2nd step for A and B to emerge into a common mixing and reaction space where A and B react by diffusion

and/or turbulence.

In my invention the mechanism of mixing is quite different from that of Schubert et al.. Namely, in my invention, for example, A and B are mixed by only one step. A liquefied matter containing both A and B (not separated) is permeated through microholes of the phase separation porous glass body. A and B are mixed during the permeation in the microholes, not after emerging from the microholes. At the exit of the microholes A and B are already mixed.

Mixing effect is increased by the cylindrical shape and branch structure of the microholes of the phase separation porous glass body (bottom part of page 2 of the specification).

#### 5) Alagy et al.

Alagy et al. used silica and ceramic materials such as mullite, cordierite, silicon nitride or porous silicon carbide (refractory ceramic materials) for the reactor invented. These materials are not made by phase separation. Porous materials are generally made by sintering process if not specified especially.

In my invention any silica and ceramic materials are not used. Only phase separation porous glass body is used as a material for the invented process. The phase separation porous glass body is a quite different material from silica and ceramic materials.

I enclosed a reference copy from a book on the phase separation porous glass body written by Dr. Nakashima who got US patent No. 4657875 (1987). This patent No. is described in the specification of my invention (upper one third of page 6).

#### 6) At the end

As described at Conclusion by Dr. Nakashima, the development of new applications of the phase separation porous glass body are highly expected.

Professor Ohishi of Kanagawa University (Japan) is under research on my invention at present and Dr. Anucha Wannagon of National Metal and Materials Technology Center, Glass & Ceramics researcher (Thailand) is going to research on my invention through the intermediation of Mr. Iwasaki who is engaged in the trade between Thailand and Japan.